Generation-X

Reliability/Safety

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Reliability Summary

- **Constellation Reliability Will be Low for 5 Year Mission if 4 are Required**
- **New Technology & Deployed Items Present Mission Success Problems**
  - **Assemble & Test at LEO of as Many Subsystems as Possible**
- **Design for Least Deployments at L2**
  - Body Mounted Solar Cells
  - Design for Petals &/or Antennas deployed at LEO
- **LEO Assembly Reliability Benefit**
  - **Based on Ability to Replace or Repair at LEO**
  - Robotic Deployment Items are not likely to be tested until on station

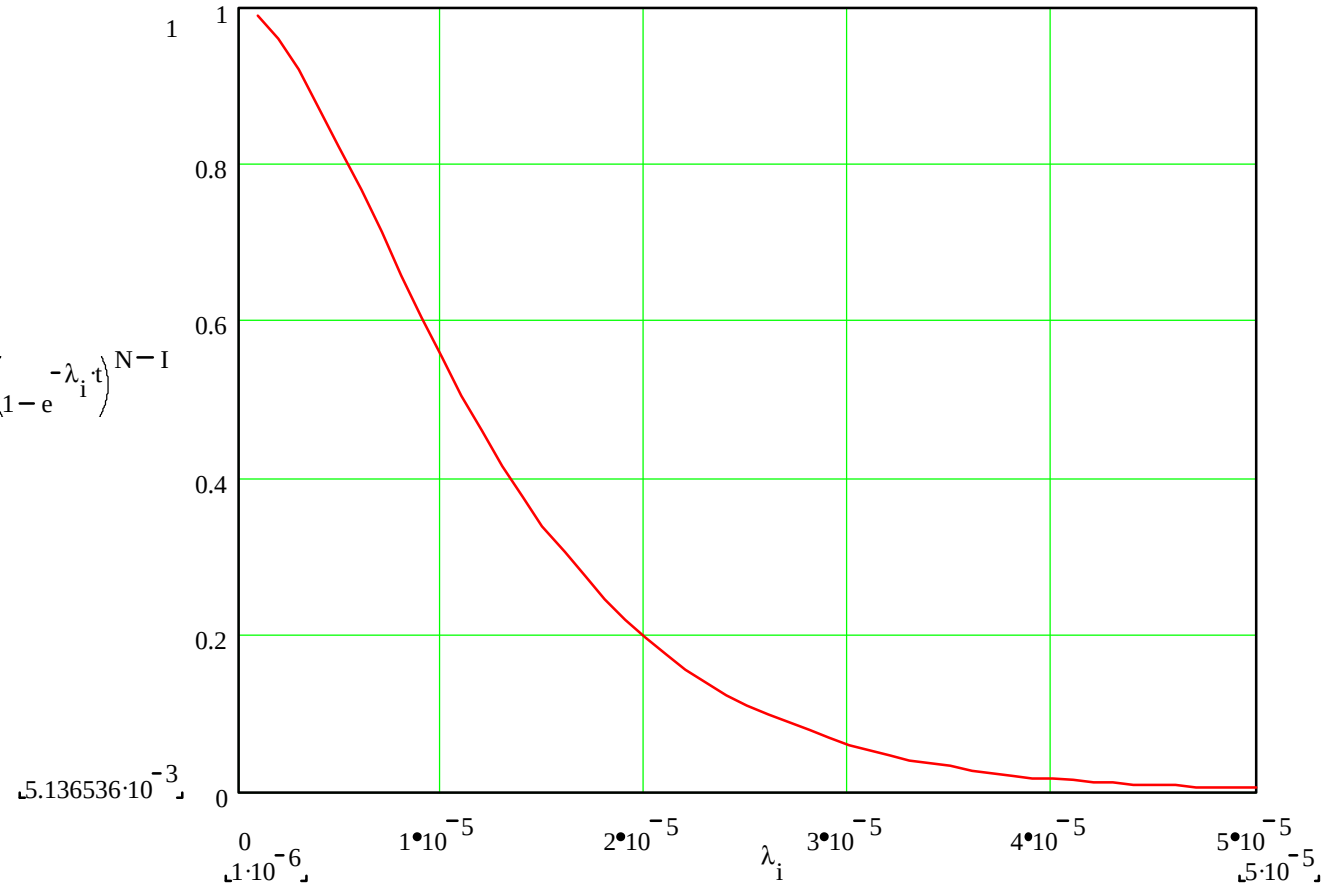
Constellation Mission Success

- **Based on a 5 Yr Mission**
  - One S/C will have only 52% Reliability based on an estimated failure rate of 15 failures X 10-6 hrs.
  - Mission Success Criteria of 1 Out-of 4 operating needed to approach 70% Constellation Reliability !
  - Attached is curve for 3 out-of 4 S/C

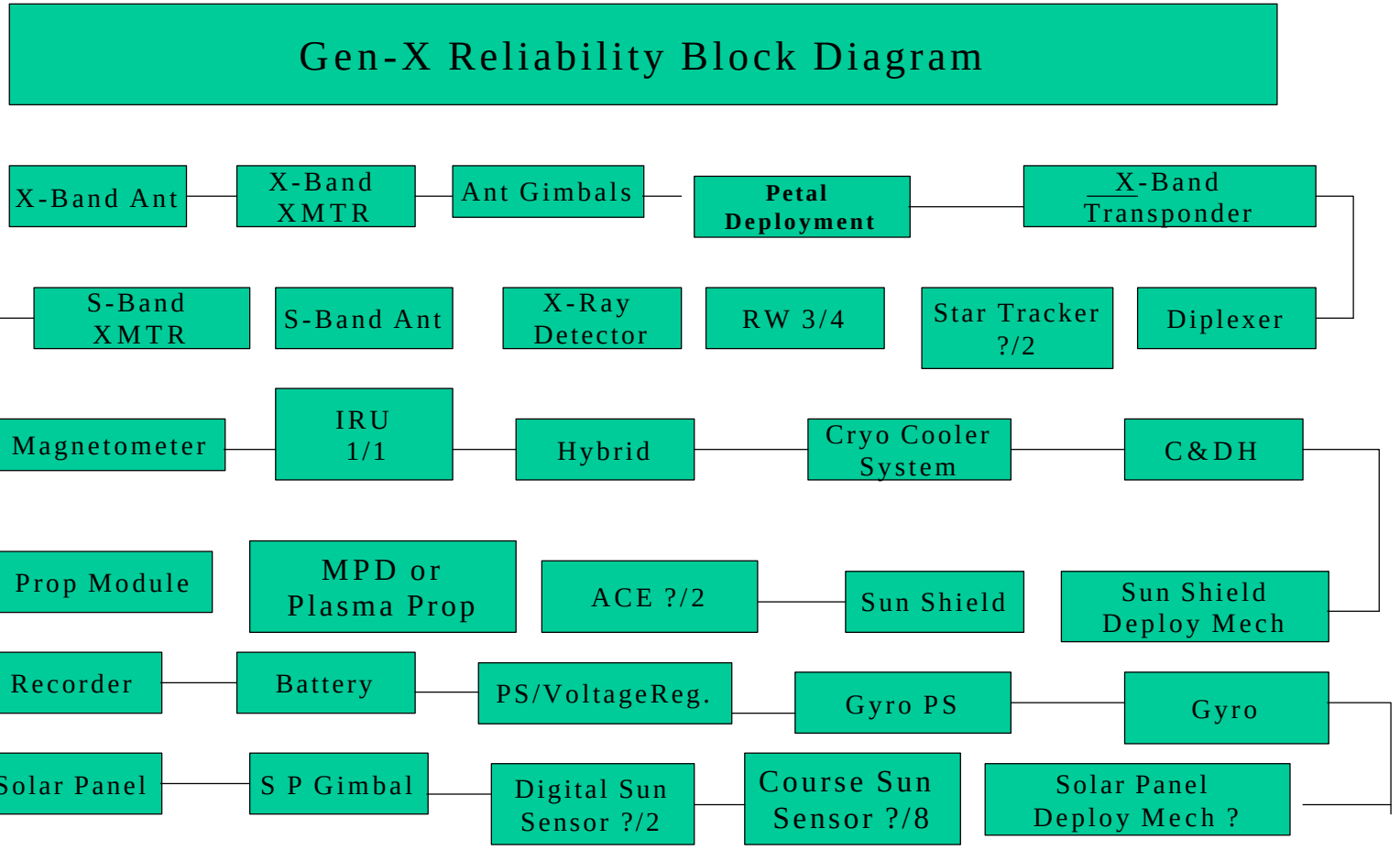
- **Based on a 3 Yr Mission**
  - One S/C will have only 67 % Reliability based on an estimated failure rate of 15 failures X 10-6 hrs.
  - Mission Success Criteria of 2 Out-of 4 Operating needed to approach 70% Constellation Reliability .

5 Year Mission-Mission Success
3 out-of 4 S/C

$$\sum_{I=M}^{N} \frac{N!}{I!\cdot(N-I)!}\cdot\left(e^{-\lambda_i\cdot t}\right)^{I}\cdot\left(1-e^{-\lambda_i\cdot t}\right)^{N-I}$$



Gen-X Reliability Block Diagram



Reliability Assumptions & Mission Success

- **Assumptions**
  - Each S/C of the 4 units will have a Total Failure Rate in the 10-30 Failures per Million Hrs.
  - Five (5) Yr Mission
    - Mission Success at 1 out-of 4 Operating > 99-70%
    - Mission Success at 2 Out-of 4 Operating > 90-30%
    - 3 Out-of 4 Operating > 78-25%
    - 4 Out-of 4 Operating > 20-0%
  - Three (3) Yr Mission
    - Mission Success at 1 Out-of 4 Operating > 99-92%
    - Mission Success at 2 Out-of 4 Operating > 97-60%
    - 3 Out-of 4 Operating > 78-25%
    - 4 Out-of 4 Operating > 35-5%

Safety

- **Standard EWR 127-1 Safety Requirements for WTR (Vandenberg) & ETR (KSC/Patrick AFB)**
- **KSC Bookmarked on Task Sheet**
  - Hydrazine
  - High Pressure Batteries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